AMENDMENT OF THE CLAIMS

1. (currently amended) A system for protecting an electric motor ~~(1)~~ and its control circuit ~~(2)~~,

the control circuit ~~(2)~~ comprising a set of switches ~~(Ch)~~ to control the speed of the motor ~~(1)~~,

the system being characterized by:

comprising a control central ~~(7)~~ connected to the control circuit ~~(2)~~, the ~~central~~ control central ~~(7)~~ being capable of measuring an electricity conduction time ($T_c$) of each of the switches ~~(Ch)~~ and to measure a time ($T_d$) passed between the beginning of the conduction of one of the switches ~~(Ch)~~ and the occurrence of a surge current, the surge being measured by means of a surge detector ~~(3)~~ which compares the value of a current ($I_{RS}$) that flows trough the control circuit ~~(2)~~ to a predetermined current ($I_{LIMIT}$) value,

the control central ~~(7)~~ making a comparison between the times ($T_d$, $T_c$) and being capable of determining whether the surge current results from an overload or from a short-circuit on the electric motor ~~(1)~~ or any of the switches ~~(Ch)~~.

2. (currently amended) A system according to claim 1, characterized in that the control central ~~(7)~~ indicates a condition of short-circuit of the motor ~~(1)~~ or on one of the switches ~~(Ch)~~ when the time ($T_d$) is shorter than the time ($T_c$) multiplied by a factor (k) that ranges from 0 to 1, and the control central ~~(7)~~ indicates a condition of ~~surge~~ overload of the motor ~~(1)~~ when the time ($T_d$) is longer than the time ($T_c$) multiplied by the factor (k).

3. (original) A system according to claim 2, characterized in that the factor (k) is equal to 0.5.

4. (currently amended) A method for protecting an electric motor ~~(1)~~ and its circuit ~~(2)~~, the speed control of the motor ~~(1)~~ being carried out by means of a set of switches ~~(Ch)~~, the method being characterized by comprising the steps of:

measuring an electricity conduction time ($T_c$) of each of the switches ~~(Ch)~~,

measuring a time ($T_d$) passed between the beginning of conduction of one of the switches ~~(Ch)~~ and the occurrence of a surge, and

comparing the times ($T_d$, $T_c$) and consequently determining whether the surge current results from an overload or from a short-circuit of the electric motor ~~(1)~~ or on any of the switches ~~(Ch)~~.

5. (currently amended) A method according to claim 4, characterized in that, in the comparison step, a condition of short-circuit of the motor ~~(1)~~ or on one of the switches (Ch) is indicated when the time ($T_d$) is shorter than the time ($T_c$) multiplied by a factor (k) that ranges from 0 to 1, and an overload condition of the motor ~~(1)~~ is indicated when the time ($T_d$) is longer than the time ($T_c$) multiplied by the factor (k).

6. (original) A method according to claim 5, characterized in that, in the comparison step the factor (k) is equal to 0.5.

7. (currently amended) An electric motor ~~(1)~~ having phases ~~(F)~~,

the phases ~~(F)~~ being fed by a set of switches ~~(Ch)~~, and

the switches ~~(Ch)~~ being controlled by a control circuit ~~(2)~~ to modulate a voltage that is applied to the phases ~~(F)~~ to control the speed of the motor ~~(1)~~,

the motor ~~(1)~~ being characterized in that the control of the switches ~~(Ch)~~ is carried out by a control central ~~(7)~~ connected to the control circuit ~~(2)~~,

the control central ~~(7)~~ being capable of measuring the electricity conduction time ($T_c$) of each of the switches ~~(Ch)~~ and to measure the time ($T_d$) passed between the beginning of conduction of one of the switches ~~(Ch)~~ and the occurrence of a surge current,

the surge being a value of a current ($I_{RS}$) that flows trough the phases ~~(F)~~ higher than a predetermined current ($I_{LIMIT}$) value,

the control central ~~(7)~~ making a comparison between the times ($T_d$, $T_c$) and being capable of determining whether the surge current results from an overload or from a short-circuit of the phases ~~(F)~~ of the electric motor ~~(1)~~ or any of the switches ~~(Ch)~~.

8. (currently amended) A motor according to claim 7, characterized in that the control central ~~(7)~~ indicates a condition of short-circuit of the motor ~~(1)~~ when the time ($T_d$) is shorter than the time ($T_c$) multiplied by a factor (k) that varies between 0 and 1, and the control central ~~(7)~~ indicates a condition of overload of the motor (1) when the time ($T_d$) is longer than the time ($T_c$) multiplied by the factor (k).

9. (original) A motor according to claim 8, characterized in that the factor (k) is equal to 0.5.

10. (new) A protection system for protecting a control circuit of an electric motor and protecting the electric motor,

the control circuit comprising a set of switches to control the speed of the motor,

the system comprising a control central connected to the control circuit, the control central selectively commanding the switches,

the control central measuring an electricity conduction time ($T_c$) of each of the switches and measuring a disturbance time ($T_d$) passed between the beginning of the conduction of one of the switches and the occurrence of a surge current, the surge being measured by means of a surge detector which compares the value of a current ($I_{RS}$) that flows through the control circuit to a predetermined current ($I_{LIMIT}$) value,

the control central making a comparison between said the disturbance time ($T_d$) and the conduction time ($T_c$) to determine whether the surge current results from an overload or from a short-circuit on the electric motor or any of the switches.

11. (new) A system according to claim 10, wherein the control central indicates a condition of short-circuit of the motor or on one of the switches when the disturbance time ($T_d$) is shorter than the conduction time ($T_c$) multiplied by a factor (k) that ranges from 0 to 1, the control central indicating a condition of overload of the motor when the disturbance time ($T_d$) is longer than the conduction time ($T_c$) multiplied by said factor (k).

12. (new) A system according to claim 2, wherein said factor (k) is equal to 0.5.

13. (new) A method for protecting a control circuit of an electric motor and protecting the electric motor,

the speed control of the motor being carried out by selectively commanding a set of switches,

the method comprising the steps of:

measuring an electricity conduction time ($T_c$) of each of the switches,

measuring the disturbance time ($T_d$) passed between the beginning of conduction of one of the switches and the occurrence of a surge,

comparing the disturbance time ($T_d$) with the conduction time ($T_c$).

14. (new) A method according to claim 13, wherein, in said comparison step, a condition of short-circuit of the motor or on one of the switches is indicated when the disturbance time ($T_d$) is shorter than the conduction time ($T_c$) multiplied by a factor (k) that ranges from 0 to 1, and an overload condition of the motor (1) is indicated when the disturbance time ($T_d$) is longer than the conduction time ($T_c$) multiplied by said factor (k).

15. (new) A method according to claim 14, wherein, in said comparison step said factor (k) is equal to 0.5.

16. (new) An electric motor having phases,

said phases being fed by a set of switches,

said switches being controlled by a control circuit to modulate a voltage that is applied to said phasesto control the speed of the motor,

wherein the control of the switches is carried out by a control central connected to the control circuit,

the control central measures the electricity conduction time ($T_c$) of each of the switches and measures the disturbance time ($T_d$) passed between the beginning of conduction of one of the switches ~~(Ch)~~ and the occurrence of a surge current,

the surge being a value of a current ($I_{RS}$) that flows through the phases higher than a predetermined current ($I_{LIMIT}$) value,

the control central making a comparison between the disturbance time ($T_d$) and the conduction time ($T_c$) to determine whether the surge current results from an overload or from a short-circuit of the phases of the electric motor or any of the switches.

17. (new) A motor according to claim 16, wherein the control central (7) indicates a condition of short-circuit of the motor when the disturbance time ($T_d$) is shorter than the conduction time ($T_c$) multiplied by a factor (k) that varies between 0 and 1, the central indicating a condition of overload of the motor when the disturbance time ($T_d$) is longer than the conduction time ($T_c$) multiplied by said factor (k).

18. (new) A motor according to claim 9, wherein said factor (k) is equal to 0.5.